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EDP RENEWABLES
UNDERSTANDING THE REASONS BEHIND THE SUCCESS

Case Study And Teaching Notes

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ABSTRACT

The energy sector is being revolutionised by renewables. Investors and governments are increasingly concerned about environmental changes, and betting on improving the cost-efficiency levels associated with clean energy production.

The Portuguese company, based in Madrid, EDPR can proudly claim itself as one of the top wind players, being able to succeed in this promising sector, mainly due to its strong business strategy, which is focused on the industry's key resources and capabilities.

This work project aims to describe and analyse, the emerging market and business environment for renewables', while also identifying EDPR's key milestones and sources of competitive advantage.

KEYWORDS: **EDPR**, **Renewables**, **Competitive Advantage**, **Business Strategy**

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LIST OF ABBREVIATIONS

CAPEX	Capital Expenditures
CO2	Carbon Dioxide
COP21	Conference of the Parties, 21st meeting
EBITDA	Earnings Before Interests, Taxes, Depreciations and Amortisations
EDP	*Energias de Portugal*
EDPR	*Energias de Portugal* Renewables
EU	European Union
FIT	Feed-in-tariffs
GW/GWh	Gigawatt/ Gigawatt-hour
ITC	Investment Tax Credit
IPO	Inicial Public Offer
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kW/kWh	Kilowatt/kilowatt-hour
LCoE	Levelised Cost of Electricity/ Energy
M3	Modular Maintenance Model
M&A	Mergers and Acquisitions
MACRS	Modified Accelerated Recovery System
O&M	Operation and Maintenance
OPEX	Operational Expenditures
PPA	Power Purchase Agreement
PV	Photovoltaic
RCF	Retained Cash-Flow
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
TW/TWh	Terawatt/Terawatt-hour
UK	United Kingdom
US	United States (of America)
VRIO	Valuable, Rare, Imitable, Organisation analysis
YoY	Year over Year

01 INTRODUCTION

Madrid 26 July, 2017, one of the largest wind energy producers in the world, EDP Renewables (EDPR), was able to once again, surprise investors by announcing that, during the first half of the year, revenues increased to €988 million, while the EBITDA reached €719 million (both +11% YoY)[1], along with an increase of 707 MW to its installed capacity[2]. Nine years after it's IPO on the Euronext Lisbon stock exchange, EDPR can proudly claim that, between January and June of 2017, has supplied 14.5 TWh of green electricity (plus 9% YoY), avoiding 12 mt of CO_2 emissions.

The renewable energy sector is becoming critical to the ongoing energy transformation. During 2016, globally the additions of renewable power capacity surpassed all fossil fuels (net capacity) combined - nearly 62% of the global net capacity additions[3].

Renewables are relevant, not only as a mechanism necessary to stop climate change and comply with international agreements, but also because, it is becoming the cheapest option in many parts of the world. In fact, wind and solar PV technologies are already able to compete with conventional technologies[4].

EDPR understood the potential of the new energy market, and developed a competitive business model, based on efficiency, ability to adapt and face new challenges. With a solid position on the Iberian and US market, EDPR played a key role for Portugal's top five position worldwide[5], regarding wind power capacity *per capita.*

02 RENEWABLE ENERGY MARKET OVERVIEW | WIND & SOLAR PV

The energy sector is being revolutionised by renewables. Governments and investors keep betting on clean-tech, in order to boost innovation and find new solutions to global issues, such as the increasing demand for energy.

Renewables employed 9.8 million people in 2016, and accounted for 2,017 GW of total installed capacity worldwide - including hydro. The growth in world's primary energy demand, by an annual

average of around 1.8% since 2011[6], together with a continued decline in prices for renewable energy technologies, are on the basis of an ongoing growth and geographical expansion of renewables.

The solar PV and wind are now joining the hydro power, challenging fossil fuels, becoming cost-competitive and flexible. Nowadays, 24.5% of the worldwide electricity is generated by clean energy productions (16.6% hydro, 4.0% wind and 1.5% solar), and by the end of 2016, the top countries for total installed renewable electric capacity continued to be China, US, Brazil, Germany and Canada[7].

Renewables play an important role through new production processes, that are able to simultaneously, reduce the global emissions of CO_2 and challenge competition's conventional technologies. Besides, renewables are a key driver for economic growth, regional development, increase in energy security, create new employment and enhance human welfare.

SUPPORTIVE POLICY INSTRUMENTS

The increasing concern of an eventual climate change, which is a consequence for the release of critical amounts of carbon dioxide, is spreading throughout the world. Across the globe a low-carbon transition is already underway[8] and the electricity sector will definitely play a central role to achieve this goal.

In 2015, a climate agreement between nearly 200 countries, committed world leaders to keep global warming below 2ºC. This international climate accord is known as the *Paris Climate Change Agreement*, and it is responsible for a crucial wave of action, regarding environment policy reform worldwide. According to the Climate Action Tracker, the goal of a fully decarbonised power system by 2050, will imply a power system build entirely of renewables[9].

In order to fulfil the agreement, governments realised that renewables' projects must be supported by a wide rage of subsidies - *supportive policy instruments* - to become competitive with the

traditional energy market. Among the instruments, it is common to find feed-in tariff (FIT) systems and quota obligations, but also, investment grants, low interest loans and tax exemptions.

EVOLUTION OF RENEWABLES ACROSS THE GLOBE | WIND AND SOLAR PV

For Europe to achieve the existing climate targets for 2030, renewables share, in the electricity mix, must be at least of 50 percent, with wind and solar PV contributing 30 percent[10]. The reason behind these numbers is simple: these two types of green energy are by far the cheapest zero-carbon power technologies. Besides, both complement each other as their generation patterns are different. As a consequence, the power system will be based on wind power, solar PV and flexibility. Although Europe is leading this trend[11], also on a worldwide scale, wind and solar are able to achieve the best results, regarding levelised cost of electricity (LCoE). **See Appendix A.1.**

WIND

There are two types of wind renewable projects, onshore and offshore. Although, both are becoming more cost-competitive, offshore is still considered expensive. The type of technology involved is able to deliver higher energy production, but due to the more complex grid connection and construction process, the capex linked to offshore is extremely high. Since 1990, onshore wind in Europe has suffered a cost decrease of more than 50 percent, and in 2015 the LCoE was around 3.15 ct/kWh up to 11 ct/kWh. Besides, the wind turbines are nowadays 15 times more powerful than 20 years ago[12].

In 2016, 54.7 GW of wind capacity were grid-connected, leading to a global installed capacity of nearly 487 GW[13]. China is the leader of wind power capacity, with a total of 169 GW (from the new 23.3 GW additions, 0.6 GW were offshore), followed by the US's 82.2 GW. Although, the remarkable achievements of these two players, Europe can proudly state that, almost 90 percent of new power in 2016, were coming from renewable sources. For the first time, wind was able to overtake coal and became the second largest source of power in Europe[14]. During 2016, 12.5 GW of

wind capacity were installed, amounting a total of 153.7 GW across the european countries. Germany is the leader with 50.0 GW, followed by Spain, UK, France and Italy. **See Appendix A.2**

SOLAR PV

During 2015, solar PV technology in Europe achieved a LCoE range of 8 up to 17 ct/kWh, becoming a strong competition for hard coal (7-11 ct/kWh) and gas (7-12 ct/kWh). Costs for solar PV have fallen by up to 80 percent since 2008[15]. Despite of the remarkable results, solar PV faces a huge challenge. In order to achieve significant production levels, it is necessary to build extremely large farms, and therefore occupy much more space, when compared with wind. The demand for space, can be a problem, mainly because farms are usually built on areas with good conditions for agricultural purposes. Across the globe it is possible to count 303 GW of solar PV installed capacity and during 2016, at least 75 GW of solar PV capacity was added worldwide – equivalent to the installation of more than 31,000 solar panels every hour[16]. **See Appendix A.3**

The growth of renewables' market, has three main drivers. Firstly, the increase of environmental concerns, already spread across the globe. Which is translated into, global agreements under the COP21 and ambitious CO_2 reductions targets, in crucial markets like China and EU. And caused by climate change and pollution, which are the main reasons for this increasing concern. Secondly, by the trend of economy electrification. And thirdly, by the search for energy independence in most developed countries, due to an increase in energy imports. Currently, the EU imports more than 50 percent of its demand, while in the US only 15 percent is imported. Traditionally, the US has been committed to be energy independent, and developed policies to achieve the goal of becoming exporters.

The high dependence on imports, but also on fossil energy, such as oil and gas, is a dangerous threat, and most economies have stressed the need to invest on a green domestic energy production.

03 RENEWABLES' BUSINESS CASE | WIND AND SOLAR PV

When renewable energy companies design their projects and ultimately, the overall business strategy, it is crucial to consider three key phases. First, the development, which includes the site identification; landowner agreements; renewable resources analysis; obtain consents and permits; project evaluation and funding. The second phase is related with the layout design and equipment choice, along with constructions. The last phase includes the wind and solar plant operation, where the process of generation and delivery of clean energy is managed, along with maintenance services and data analysis. **See Appendix A.4**

Transversely to the previous phases, it is important to take into account seven key elements, which essential in the renewables' business case design and development.

1. **Capex:** Capital expenditures include, all the investment in technology (turbines, solar PV), civil works (like construction costs for site preparation), grid connection costs (transformers and sub-stations, as well as the connection to the local distribution or transmission network); planning and project costs (which can represent a significant proportion of total costs); and other capital costs (e.g. construction of roads, buildings and control systems).
2. **Energy Production Levels:** In this industry, companies face a huge dependence from favourable environment conditions, and therefore it is essential to conduct studies to ensure an optimal site and technology selection[17]. In the wind energy production, for example, to maximise efficiency, the turbines models must be chosen according with wind speed forecasts.
3. **Energy Prices and Tariffs:** Power price varies significantly across countries and regions. However, integration and globalisation phenomenon are decreasing the differences in power prices across the world. According to the US Energy Information Administration, variations in power prices are directly related with: fuels, extra power plants expenditures, weather conditions and public service/utility commissions price regulations. In order to avoid price fluctuations,

PPA and subsidies strategies were developed, such as FIT, Renewable Obligations (RO) or Tax credits.

4. **Opex:** Operational expenditures can vary substantially between projects, and depend mainly on the prices agreed on the service contract and land lease. Opex include cost categories, such as, land lease, insurance, management costs and O&M. These typically assume a fixed nature, but in some projects, they may also vary according to production on a per MWh basis or as a percentage of revenue.
5. **Project-end Options:** Mostly faced by wind farms investors, because they are designed to have a useful life of 20-30 years, and after this period, operators will either decommission the facility, or aim to extend its useful life through repowering or overhauling. These options depend primarily on factors such as availability of land lease extension, physical state of equipment, level of energy production and maintenance costs. This is a complex process and, therefore involves expenditures that must be included in the overall investment plan.
6. **Financing:** Owners can choose to finance their projects, either by using their own balance or through a project company, known as special purpose vehicle (SPV)[18]. Due to the high capital requirements, the lasted process is most common on this sector. With SPV structures it is possible to obtain non-recourse debt financing.
7. **Risk and Uncertainty:** The risk and the return on equity, as well as the capital structure ratio between debt and equity varies between project and country. Renewable power projects have significant differences in the average cost of capital and the LCOE. Renewable projects are by definition run under great amounts of uncertainty and, therefore are classified as very risky. The risk is linked to the projects' capital intensive and long-term characteristics, but also because its operational efficiency is exposed to uncertainties related with weather conditions, exchange rates, energy price and others.

Based on these main elements, companies within this industry, developed four key operational metrics, that are often used to evaluate efficiency and productivity levels: levelised cost of electricity, availability, load factor and opex/Mw.

Levelised Cost of Electricity (LCoE): Represents the net present value of the unit-cost of electricity over the lifetime of a generating asset. It is a key formula, that includes all costs over its lifetime: initial investment, cost of capital, O&M, cost of fuel[19].

Availability: Measures the percentage of time the equipment is fully operational. A 95% availability means that, in a given period, the asset was available to produce energy 95% of the time, and the remaining 5% of the time was used for maintenance or repairs.

Load Factor: Ratio between the net megawatt hours of electricity generated, in a given year, and the electricity that could have been generated at continuous full-power operation[20].

Opex/Mw: The operating expenditure generated from each unit of installed capacity.

04 EDP RENEWABLES

EDP's renewable activity, began in 1996, with the construction and operation of wind farms in Portugal. At that time, EDPR was entirely owned by the EDP group, which was the largest utility company in Portugal. The monopoly status as Portugal's electricity provider was being confronted, and EDP decided to invest in the renewable segment, by implementing an internationalisation expansion. Besides Portugal and Spain, soon the company was present in four new countries, namely US, France, Belgium and Poland. The process of expansion was mainly through acquisitions of early stage/greenfield projects.

In 2007, EDP decided to pursue a strong move in its strategy, with the acquisition of an established wind power giant, Horizon Wind Energy LLC, a Goldman Sachs-owned renewables company based in Texas. To accomplish the acquisition but also, to pursue further sustainable growth, the

company raised €1.57 bn through an IPO of 25% of its ownership. This operation was a success, which enabled EDP to fulfil the capital needed but also, increased the visibility of EDPR in the renewable energy sector. In fact, after this key acquisition, the company was able to move into the position of fourth largest wind energy producer in the World.

In 2010, EDPR consolidated its strong player position, through a huge contract with *Vestas*, a turbine supplier. This was a strategic crucial move, that enabled EDPR to ensure the supply of turbines, at a time were the demand for wind turbines was outstripping supply. This, together with a outstanding M&A activity and other partnerships across the globe, enabled EDPR to strived in such a complex but expanding market. **See Appendix A.5**

In 2016, EDPR is considered the fourth largest wind energy producer[21], with a total installed capacity of 10,408 MW, distributed across eleven countries between, North America, Europe and Brazil. **See Appendix A.6** EDPR is the "raising star" of the group and currently, responsible for 32% of EDP Group's 2016 EBITDA. The company has been able to deliver outstanding results, together with an increase of capacity additions. During the last year, the company add more 0.8 GW of installed capacity, and achieve a 30% load factor, technical availability of 97.7% and a core opex/ MWh of €16,3. **See Appendix A.7**

Since 2008, EDPR was able to achieve an outstanding 65 percent increase on revenues, along with a 63% increase on EBITDA and more 66% of operating cash-flow. The installed capacity and electricity generated increased, respectively, 58% and 68% since the IPO. **See Appendix A.8**

The exceptional performance of EDPR, positioned the company among the top four players, regarding the industry of wind energy production, competing with strong international companies like, *Iberdrola, SA*, *Enel Green Power*, *China Longyuan Power Group Limited* and *China Power New Energy*.

When asked about the success of EDPR, the current CEO, João Manso Neto stated:

"I can point to three essential qualities: our strong market positioning, solid balance sheet and excellent technical and human capital.[22]"

05 EDPR FUNDAMENTAL STRATEGY

The success of EDPR is remarkable, but the reasons behind this success, according to João Manso Neto, the CEO of the company, can be easily explain by its fundamental strategy.

"Since its inception, EDPR has been performing a strategy focused on selective growth, by investing in quality projects with predictable future cash-flows, and seamless execution, supported by core competences that yield superior profitability, all embedded within a distinctive self-funding model designed to accelerate value creation[23]".

THE THREE FUNDAMENTAL PILLARS

EDPR strategy has been characterised by its flexibility and by the success in adapting its business model to the ongoing market evolution. However, throughout the years, the company's business strategy has been based on three key strategies, that provide focus and remain constant since the beginning. These three fundamental pillars are: Selective Growth, Operational Excellence and the Self-Funding Model. The business model is set to deliver a predictable and solid growth in EDPR's core markets. The key indicators used to measure the business strategy success include, Electricity Output, EBITDA, RCF, Net Profit and Dividend Pay-Out. EDPR is truly committed to achieve a lead position, in the renewable sector.

SELECTIVE GROWTH

EDPR focused its investment strategy in quality projects with a predictable cash-flow stream. To achieve a solid value creation, the company prioritises quality investments in core markets, which are the US and Europe, along with technology mix initiatives and visibility on projects with long

term contracts. This process, ensures that projects have the best fit with the low risk profile of the company.

OPERATIONAL EXCELLENCE

Maximising the operational performance of its wind and solar PV plants has always been a keystone for EDPR. The company believes that a profitable growth, must be achieved by distinctive core competences and an unique technical know-how. To achieve operational excellence, EDPR focuses on improving three crucial areas: maximise the production (technical availability), invest in projects that can compete and lead to superior load factors and an unique O&M model, design to optimise the balance between in-house and outsourcing activities, and keep the levels of opex low. **See Appendix A.9**

To achieve operational excellence, the access to innovative high-tech equipments and softwares is one of the keys to sustain competitive advantage and support growth. Therefore, EDPR is constantly developing partnerships with universities and suppliers, investing on disruptive prototypes and projects. **See Appendix A.10**

SELF-FUNDING MODEL

Although the former two pillars are important to the successful outcome of EDPR's strategy, the self-funding model has been the cornerstone, crucial for funding growth. The way EDPR approached the funding issue, generated one of its main capabilities. This innovative model, relies on a combinations of three financial instruments: Retained Cashflow from the operating assets, EDPR's Asset Rotation strategy, together with US Tax Equity structures. **See Appendix A.11**

Retained Cash Flow

EDPR's primary source of fund raising is the cash flow generated from the operational assets. The RCF is the result of EDITDA from operations, after deducting paying debt services costs, capital distributions to equity partners and taxes.

Asset Rotation

The proceeds from asset rotation transactions are an important source of external funding. These transactions involve the company selling minority stakes (usually 49%) from projects, while keeping full management control over them. Typically, the projects under asset rotation tend to be mature and operationally efficient. These assets are, therefore, very attractive to investors due to their low risk profile and stable cash-flows. The asset rotation strategy gave EDPR a powerful source of competitive cost of debt, which is crucial in a capital intensive industry, like the renewables.

US Tax Equity

EDPR always wanted to keep the levels of debt relatively low and seek for external financing to its projects. Across the world, but mainly in the US market, companies like EDPR benefit from federal clean energy incentives, namely thought instruments like ITC, bonus depreciation or accelerated MACRS depreciations. These tax benefits can only be used by clean energy developers, that are profitable enough to pay income taxes. EDPR, as other companies in the industry, found that using "tax equity" investments is a more efficient way to use these tax benefits. The tax equity consists in a partnership between renewable companies and investors who can use the tax benefits. EDPR typically practice the Partnership Flips agreements[24], where the developer - or sponsor - and tax equity investor form a joint venture partnership. Profits, cash, and tax benefits allocation "flip" between the parties one or more times during the life of the partnership.

At EDPR, the investors that use tax equity contribute to a large part of the initial project investment. The return is made through Production Tax Credits - dominant in wind and represent extra revenue per unit of electricity - which are granted to the project for the first 10 years of operation, along with the benefits from MACRS accelerated depreciation.

Besides the top operational excellence performance, EDPR was able to understand that to thrive in such a competitive and capital intensive industry, financial and M&A capabilities would be crucial to achieve success.

Along with this three pillar business strategy, EDPR developed a detailed approach to Risk Management Processes. The goal is to evaluate risks and opportunities impacting the business, while minimising fluctuations of results. EDPR's Risk Management team classified the company's risks in five main risk categories: market, counterparty, operational, business and strategic. Due to the sector's complexity and capital intensive characteristics, the risk map and mitigation strategies play a key role in the success of EDPR. **See Appendix A.12**

BUSINESS PLAN 2016-2020

On May 2016, João Manso Neto and the Investors Relations department, were presenting to the financial community its new Business Plan for 2016-2020. This important event was made in London at the EDP Group Day. The press, investors, analysts and rating agencies, were all feeling confident about the new strategy that EDPR had planned for the next years.

EDPR believes that with the new business plan, will be able to achieve five main goals until 2020:

1. **Selective and profitable growth generating higher production,** adding more 10% of GWh installed capacity.
2. **Higher efficiency and accretive capacity additions,** increase the EBITDA by 8%.
3. **Quality portfolio with sound cash flow generation**, achieving by 2020 €0.9 bn of RCF.
4. **Increasing profitability for EDPR shareholders**, through an increase of 16% on the Net Profit until 2020.
5. **Maintaining its dividend policy**, between 25%-35%.

The company plans to face the next years, with stronger capacity additions and technological mix. Regarding the Selective Growth pillar, aims to add 3.5 GW until 2020, with a 10% growth on solar

PV, given its increasing competitiveness, but also keep investing on offshore. The expansion will be focused on projects with, low risk profile and high operational performance. From the total capacity addition, 65% will be developed in North America (driven by PPAs already secured), 15% from Europe (focusing on low risk frameworks) and 10% from Brazil (in projects with long-term PPAs).

Regarding the Operational Excellence targets, EDPR plans to maintain the level of availability higher than 97.5%. This goal will be achieved through, new predictive maintenance optimisation measures, supported by a 24/7 control and dispatch centre. The company will therefore focus on reducing to a minimum any malfunctions and performing maintenance activities in the shortest possible framework. EDPR will be also focused on competitive projects, that are able to generate the maximum amount of energy possible. The target is to optimise the load factor to 33% until 2020, mainly on the back of the increase of competitiveness of new additions. To complement the previous operational excellence initiatives and boost production, the company will be also committed to increase efficiency, reducing core opex/MW by 1% until 2020. The core opex represents the costs of Suppliers & Services plus Personnel, which are the ones controllable by the company. EDPR will implement its M3 system and the Self-performance program to some wind farms. These systems optimise the decision between outsourcing or insource maintenance activities. Usually, EDPR keeps the control of high-value activities such as maintenance planning, logistics, and remote operations. By 2020, the target is to achieve 50% of the portfolio under the M3 and Self Perform programs.

For the period of 2016-2020, EDPR targeted a rigorous investment plan, based on a quality portfolio able to generate a robust RCF. It is expected a cumulative €3.9 bn of RCF, a Capex and Financial Investment of €4.8 bn (10% on offshore), and a cumulative €1.1 bn from Asset Rotation - were €0.6 bn is generated from new Asset Rotation.

The company will also be focused on the US Tax Equity external funding. In 2016, EDPR signed two tax equity transactions, which represents a total funding of $457 million - 429 MW.

06 LOOKING TO THE FUTURE

The future seems promising for renewables. According to the latest New Energy Outlook[25] from *Bloomberg*, 72% of the $10.2 trillion spent on new power generation worldwide until 2040 will be invested in new wind and solar PV. The investment on renewables will be boosted by the concern, regarding CO_2 emissions, but also by the increasing demand for utility-scale batteries and solar PV use at homes. The Chinese and Indian markets will be the main responsible for new investment, mainly due to the severe problems regarding air pollution, and the extreme costs associated with emissions of CO_2.

In Europe, according to the WindEurope's 2030 Scenarios Report[26], by 2030 wind will be able to generate 569,000 jobs, avoiding 383 Mt of CO_2 and €13,200 million on fossil fuel imports, achieving the 323 Gw and 29.6% share of EU's electricity demand. These results, are a consequence of the Clean Energy Package proposals presented by the European Commission in November 2016.

Although the future scenario seems promising to the industry on a worldwide scale, when asked about recent political developments in the US, EDPR's CEO could not deny his concern. The new US direction already withdrawn the Paris Agreement, and stated a patriotic and protectionist approach to foreign business.

Some concern about the US's new political landscape for renewables made a noticeable impact on our stock price performance since the last quarter of the year. We always act as takers of the political choices made by voters and citizens, and we never speak out publicly about governing bodies of countries where we operate.

07 CASE SYNOPSIS

The case study aims to understand the reasons behind the success of EDPR. The company has been able to succeed in a competitive fast changing sector, achieving high levels of performance. EDPR focused its business strategy on selective growth, operational excellence and an efficient self-funding model. The generic “three pillars" strategic approach to business, enable EDPR a sustainable growth, which has been crucial in an industry characterised by uncertainty and capital intensive requirements.

The future seems promising to the renewables sector, but for EDPR the great dependency on the US market can be a challenge, since the new presidency has already expressed its intentions to leave the Paris Agreement.

08 OBJECTIVES

EDPR is a worldwide known Portuguese company, based in Spain, and one of the top independent energy producers. With this case study, students will be able to explore the company’s core strategy and understand the reasons behind its success. The case aims to provide a wide range of data about EDPR’s key strategies, and how the business strategy has been designed to achieve competitive advantage. It also provides key information regarding the renewables business model and market situation. Besides the data presented, students must be encouraged to search for the industry’s trends and public annual reports to collect more detailed insights.

During discussion, the main objective is to apply strategic frameworks used to analyse, the key success factors, resources & capabilities, and eventually highlight the main sources of competitive advantage of EDPR.

Because it approaches core concepts about strategy, seems appropriate to present this case study at fundamental strategy courses, such as *Advanced Strategy,* during, both masters and bachelor programs.

09 QUESTIONS & DISCUSSION

QUESTION 1. What are the key success factors for a company operating on the renewable energy industry ?

Key success factors are those variables that can affect significantly the overall competitive position of the firm in an industry (Hofer & Schendel, 1977)[27]. To survive with success, two criteria must be met: first, companies must supply what customers want - *Analysis of Demand*; second, companies must be prepared to survive competition - *Analysis of Competition*. These two common sense, but important dimensions, are crucial to identify key success factors. **See Appendix B.1**

In order to identify the key success factors for a company operating on the renewable energy industry, a brief demand and competition analysis must be conducted. These analysis aims to answer the previous questions, and facilitate the identification of the key success factors. The **Table 9.1**, aims to provide the critical points highlighted for this specific industry.

Table 9.1 | **Identifying key success factors: Renewable Energy Industry**

What do customers want ? ANALYSIS OF DEMAND	KEY SUCCESS FACTORS
• Low prices • Reliability of supply • Technical expertise • Environment concern	**Cost-efficiency** requires: • Large-scale plants • Fast availability of maintenance • High-technology innovation, to improve efficiency levels • Expert technician human capital • Availability of low-cost raw materials • Optimised grid connection activities **Risk Management** requires: • Data analysis experts • Hedging strategies (currency, energy price, interest rate) • Investment in stable markets **Financial Strength** requires: • Competitive funding strategy • Excellency in asset evaluation
What does a firm need to be prepared? ANALYSIS OF COMPETITION	
• Intense competition • Exit barriers • High fixed costs • Cost efficiency • Financial strength • Risk management • Technology innovation • Access to auctions • Flexible grid connection	

QUESTION 2. Identify and analyse EDPR's key resources and capabilities.

Strategy is about matching a firm's resources and capabilities to the opportunities that arise in the external environment (Grant, 2010)[28]. Resources and capabilities play a crucial role as the basis for strategy, and according to Grant[29], this growing emphasis is the result of two main factors. First, industry's environment have became more unstable, and therefore internal resources and capabilities give a more secure base for formulating strategy. Second, competitive advantage is apparently the main source of superior profitability, even more than industry attractiveness[30].

In 1990, the idea of assuming that the resources and capabilities played a principal role for the firm strategy and also the primary source of profitability, became known as *resourced-based view* (Prahalad & Hamel, 1990)[31]. This approach, recognises that each company possesses an unique collection of resources and capabilities, and that the key to achieve profitability is by exploiting the differences, rather than doing the same as other firms.

Before identifying the resources and capabilities, it is essential to distinguish both concepts. Resources are all the productive assets owned by the company, while capabilities are what the company can do with those assets. The organisational capabilities, when applied with the right strategy, can eventually lead to a competitive advantage. The **Figure 9.2**, shows a relationship between all the factors. **See Appendix B.2**

Regarding EDPR, first it is important to highlight its resources, to be able to properly classify the capabilities. The **Table 9.2**, identifies the main resources described in the case study and from other public documents.

As mentioned before, resources must work together to create organisational capability. Isolated, resources do not confer competitive advantage.

Table 9.2 | **EDPR Key Resources**

TANGIBLE	INTANGIBLE	HUMAN
Financial • Production tax credits • Investment tax credits • Power purchase agreements • Asset rotation mechanism • Borrowing capacity **Physical** • 10 GW of installed capacity • Turbines (on-shore and off-shore) • Grid connection assets • PPA's agreements	**Technology** • Innovative procedures and equipment • Privilege access to suppliers (eg.: *Vestas*) • Partnerships and M&A activity **Reputation** • Environmental friendly brand • Sustainable approach to businesses • Present in attractive markets like US and Europe	**Skills** • Financial expertise • Technical expertise • Data analysis and forecast expertise **Collaboration** • Communication and alignment between subsidiaries • Permanent contact with the firm's stakeholders. (eg. university fair, monthly meeting with top management)

To identify which capabilities are *core,* it is possible to use two approaches, which help companies visualise their capabilities in a more *systematic way*.

- **Functional Analysis:** capabilities are allocated to each firms' functional areas. The functional areas comprises: operations, purchasing, logistics/supply chain management, engineering, product development, marketing and sales, legal, information systems, government relations, communication, and HSE (health, safety and environment)[32].
- **Value Chain Analysis:** Michael Porter's generic value chain[33], creates a difference between primary activities - involved in the transformation of inputs and related with the customer- and supportive activities. The desegregation through the value chain analysis, provide a more detailed identification of the firm's activities[34].

To analyse EDPR's activities (and capabilities that correspond to each activity) was conducted a value chain framework analysis, showed at **Figure 9.3**.

Figure 9.3 | **EDPR Value Chain Analysis**

Firm Infrastructure

Planning: expert team of strategic analysts, with backgrounds in management, finance, geology/ biology, weather forecasters and data analysis. M&A and investment analysis activities play a key role.
Investors Relations: investor relations team based in Madrid. Road Shows and Investors Day presentations.
Financing: self-funding model, Asset Rotation, US Tax Equity and Retained Cash Flow.

Human Resource Management

Recruitment: high level of local hiring, investment in young top talent

Development: mobility, training and development programs, *Renewable Energy School*

Technology Development

Innovation: in areas like O&M (M3 model, Energy storage (*Storecare* demonstration project), Solar technology (hybrid wind and PV pilot, CPV-LAB projects), and recently Off-shore (*Windfloat* and *Demofrase3* Projects). The research and development can be done internally but also, through partnerships.

Procurement: turbines (rotor, blades, nacelle, tower, transformer), civil works, grid connection, software (eg.:control systems), storage equipment, geological and wind external studies. 99% of the purchases come from the locations in which the company operates.

Inbound Logistics	Operations	Outbound Logistics	Marketing & Sales	Service
• Grid construction • Wind/Solar feasibility studies • Distribution planning • Inventory control • Reception of equipments	• Maintenance • Management of turbines • Quality Check-ups • Forecasting • Physical and statistical modelling • Lean program (leansix sigma methodology)	• Energy storage • Distribution • Warehouse logistics • Environmental Management	• Government and investor relations • Access to auctions • Advertising clean energy potential • Partnerships with universities • Long-term PPA	• Provide supportive services along the energy distribution grid

MARGIN

Supportive Activities Primary Activities

In order to **establish** competitive advantage, resources and capabilities must have two characteristics: Be *Relevant* - able to create value to customers - and *Scarce* - "needed to play and sufficient to win" (Grant, 2010). Following Grant's strategic importance framework[35], besides the previous characteristics, resources and capabilities must be *Durable, Transferable* and *Replicable,*

in order to be able to **sustain** its competitive advantage, and *Appropriable,* to make sure that firms are organised to **appropriate** the value. A similar framework was developed by J.B.Barney[36], called VRIO that characterises strong resources and capabilities as *Valuable, Rare, Imitable, Organisation.* Grant developed a framework to analyse resources and capabilities, which is based on two parallel sub-analysis. First, use the criteria described before and classify their strategic importance to success in the business context. Second, measure the firms' relative strength on those resources and capabilities.

The final output of these analysis, will reveal the firm's resources and capabilities profile, which can be summarised in a two dimensions graphical framework, with four quadrants representing: *Superfluous Strengths*, *Inconsequential Weaknesses*, *Key Strengths* and *Key Weaknesses*. The **Figure 9.4** and **Table 9.3** below, provide a similar analysis applied to EDPR.

Figure 9.4 | **EDPR's Resource and Capability Profile**

Table 9.3 | **Resources and Capabilities of EDPR**

	STRATEGIC IMPORTANCE | 1-10	EDPR's RELATIVE STRENGHT | 1-10
RESOURCES		
People	• Critical to most of the capabilities **(8)**	• Expertise in engineering, asset valuation, operations and risk management **(8)**
Farm's Location	• Critical because production depend on good weather conditions, and a good grid/ distribution network. Also critical, due to the access to supportive policies. **(9)**	• Strong presence and dependency in the US and Europe. Excellent water conditions and access to tax benefits and other supportive policies. **(7)**
Financial	• Critical due to the intensive capital investment. **(7)**	• Positive retained cash-flow, US tax equity, asset rotation strategy. **(8)**
Technology	• Critical to deliver high levels of productivity with efficiency. **(8)**	• 97.7% availability, 30% load factor and a low opex. Outstanding the industry average. **(7)**
Brand/ Reputation	• Is an indicator of reliability for potential investors. **(5)**	• Fourth wind energy producer worldwide. Not so strong in the solar PV market. **(4)**
CAPABILITIES		
O&M	• Operations are critical to cost efficiency. Maintenance is relevant but can be easily outsourced. Mainly maintenance. **(9)**	• Very strong finding the perfect balance between in-house and outsourcing. M3 model and self-performance. **(9)**
Risk Management	• Relevant due to the high levels of uncertainty. (weather conditions, energy prices, inters rates, exchange rates …) **(9)**	• Strong risk management team and financial hedging mechanism. **(7)**
Funding Mechanisms	• Critical due to the need of intensive capital investments. **(8)**	• Very competitive, due to the self-funding approach. **(8)**
Asset Evaluation	• Critical due to the need of intensive capital investments. Site evaluations play a critical role. **(8)**	• Expert M&A team, along with a geologists, engineers and wind specialist. **(7)**
Innovation	• Play a key role for compete in this industry. **(9)**	• Strong investment in this area. Partnerships with universities and expert players in technology development. **(7)**
Government & investors relations	• Relevant due to the need of intensive capital investment. Also important to have access to tax benefits and farm locations. **(7)**	• Dynamic approach to this area (investors day, roadshows). **(6)**

EDPR should focus its strategy on the right-hand quadrants of **Figure 9.4**. The successful approach involve exploiting key strengths and managing key weakness.

After these analysis, it comes clear that EDPR has five major **core competences:** a robust and reliable funding mechanism; operational excellence; technology innovation; a strong presence in the US market and an exceptional risk management. **See Appendix B.3**

QUESTION 3. Based on EDPR's business strategy, what are its major sources of competitive advantage ?

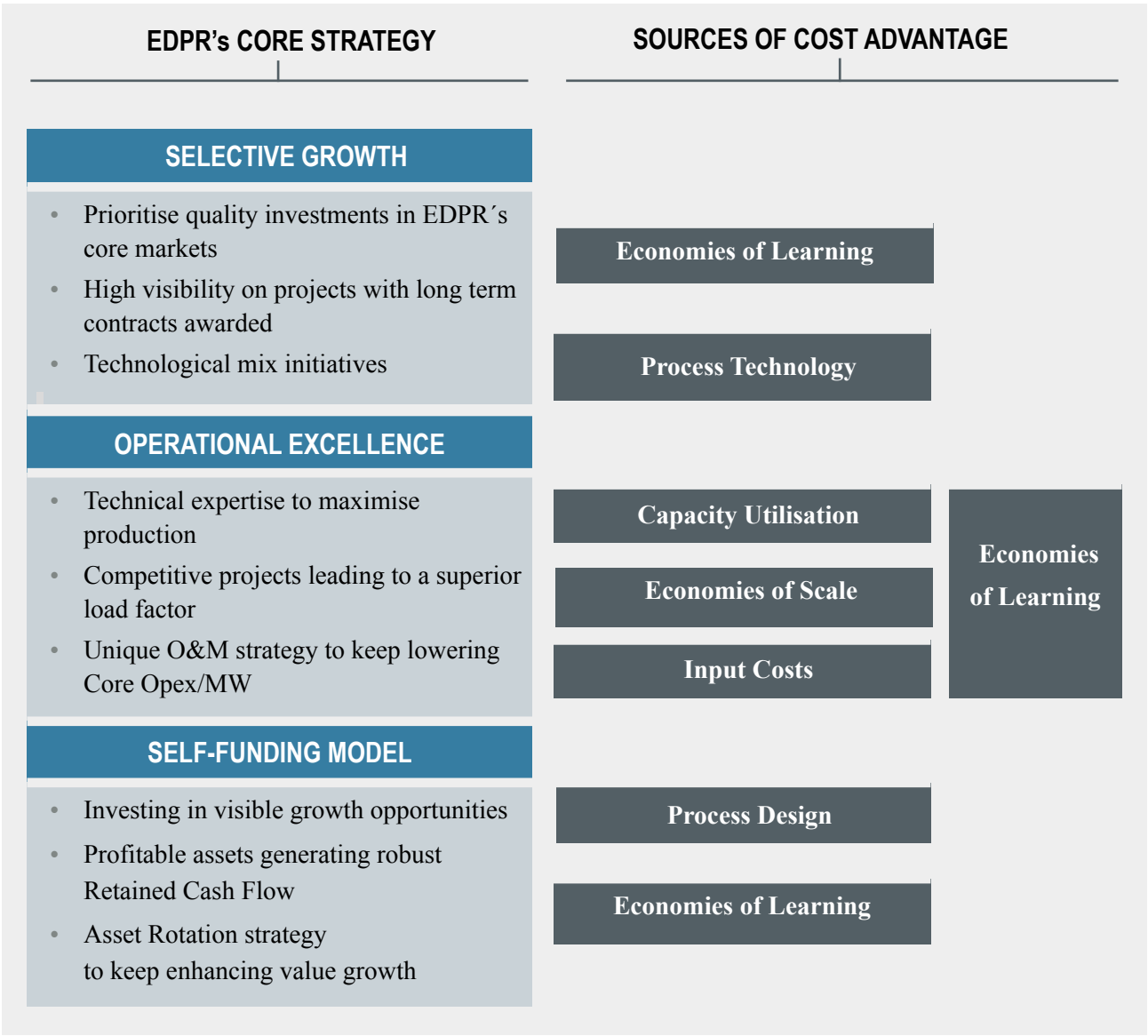
When competing in the same market, firms can surpass over a rival in one of two ways: competing with a cost advantage or with a differentiation advantage. The first, involves similar products at a lower cost (cost efficiency to archive profit with lower prices), while in the second, prices are premium due to the products' unique characteristics. By combining these two types of competitive advantage with the firm's choice of scope - wide or broader markets - Michael Porter[37] developed a framework, defining the three generic strategies: cost leadership, differentiation and focus. **See Appendix B.4**

EDPR competes in an industry where cost advantage is key for creating a competitive advantage. Energy is a commodity and therefore, firms focus their strategy on cost efficiency. According to Grants[38], there are seven main sources of cost advantage: economies of scale, economies of learning, process technology and process design, product design, capacity utilisation, input costs, and residual efficiency (**See Appendix B.5**). From these sources, Grant was able to highlight some key strategic elements and organisational requirements involved in a successful cost leadership strategy. **See Appendix B.6**

EDPR's core strategy is based on three pillars: selective growth, operational excellence and self-funding. These have been constant since the beginning of the company, and aim to explore the key sources of competitive advantage. The **Figure 9.5**, aims to match, the previous sources of cost

advantage with each of EDPR's fundamental pillars and business strategy. After this analysis, it is possible to conclude that EDPR is able to successfully explore the sources of cost advantage.

Figure 9.5 | **EDPR's Sources of Cost Advantage**



QUESTION 4. Given the recent events, explore EDPR's opportunities and threats.

In order to provide a complete analysis regarding EDPR, in additions to the previous internal analysis, it is crucial to explore the external opportunities and treats, that the company is facing. To complete both, the internal and external profiles, the SWOT analysis framework can be used. This tool was developed by Albert Humphrey during his career as a management consultant and

officially introduced in 2005[39]. It aims to highlight, systematically, companies' key *Strengths*, *Weaknesses*, *Opportunities* and *Threats*. The fist two, are related with companies' internal analysis - key resources and capabilities, and competitive advantage - while the last two require an external analysis - general environment and industry. The **Table 9.7** provides a summarised EDPR's SWOT analysis.

Table 9.7 | **EDPR's SWOT Analysis**

STRENGTHS	WEAKNESSES
• Competitive and reliable funding mechanism • Operational excellence • Access to technology innovation • *Vestas* agreement - better turbine prices • Strong presence in the US and Europe market • Exceptional risk management strategy • One of the world's top wind energy producers • Technology mix	• Over dependence on US and Iberian market • Dependency on government subsidies to provide adequate returns on investment • Dependency on weather conditions to produce energy • High exposure to energy price fluctuations • EDPR may not be able to secure appropriate power purchasing agreements (PPAs) • US leaves the Paris Agreement
OPPORTUNITIES	**THREATS**
• Developments in the wind sector • Electric vehicles bolster electricity use • Onshore wind costs fall fast, and offshore falls faster • Partnerships projects - WindFloat • EDP divestitures of stake to strengthen the wind energy business • Brazil, a growing wind energy market that benefits from strong wind resource • Europe 2030 targets (a 40% cut on CO_2 emissions ; 27% share of renewable energy consumption)	• Weak regulatory system in the US • Fluctuation in weather conditions • Operational hazard - eg. existence of infrastructures in the public domain • Decrease in energy selling prices (-5% YoY at EDPR in 2016)

Internal Analysis (data collected from the previous questions)

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EDP RENEWABLES
UNDERSTANDING THE REASONS BEHIND THE SUCCESS

APPENDIX

Case Study and Teaching Notes

Maria Beatriz Malveiro Sim-Sim Dos Anjos Silva | 3539

A Project carried out on the Master in Management Program, under the supervision of:

Professor Luís Manuel da Silva Rodrigues

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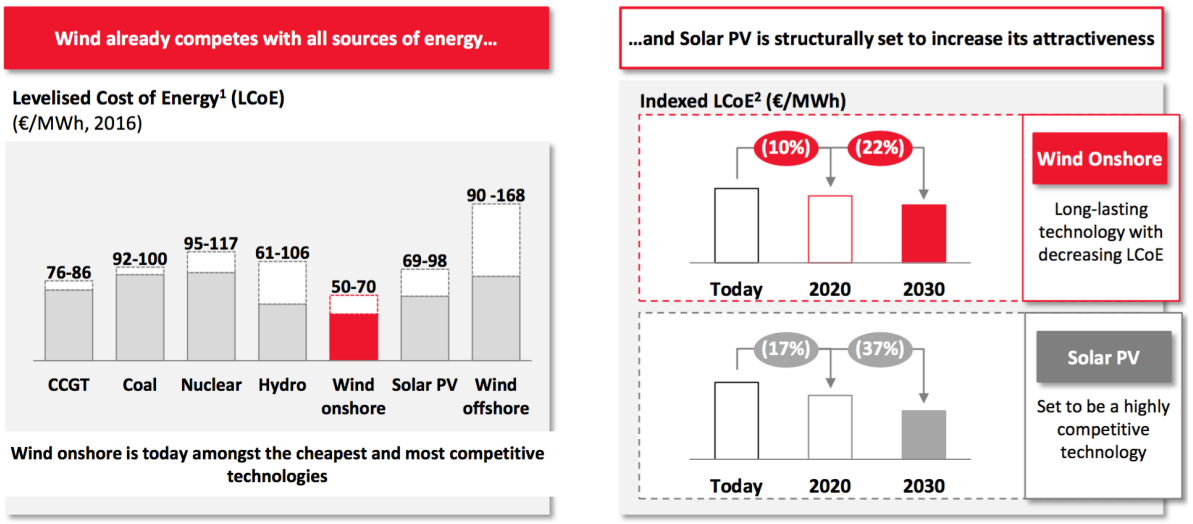
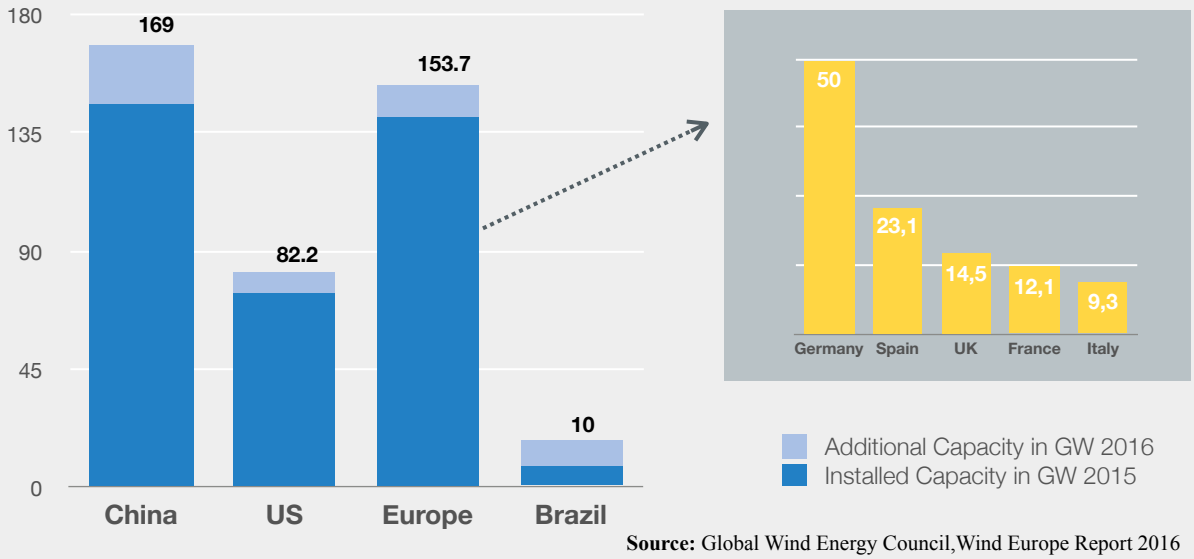
Figure 2.1 | **Levelised Cost of Energy in 2016**



Source: EDPR Investors Day Presentation, May 2016.

APPENDIX A.2

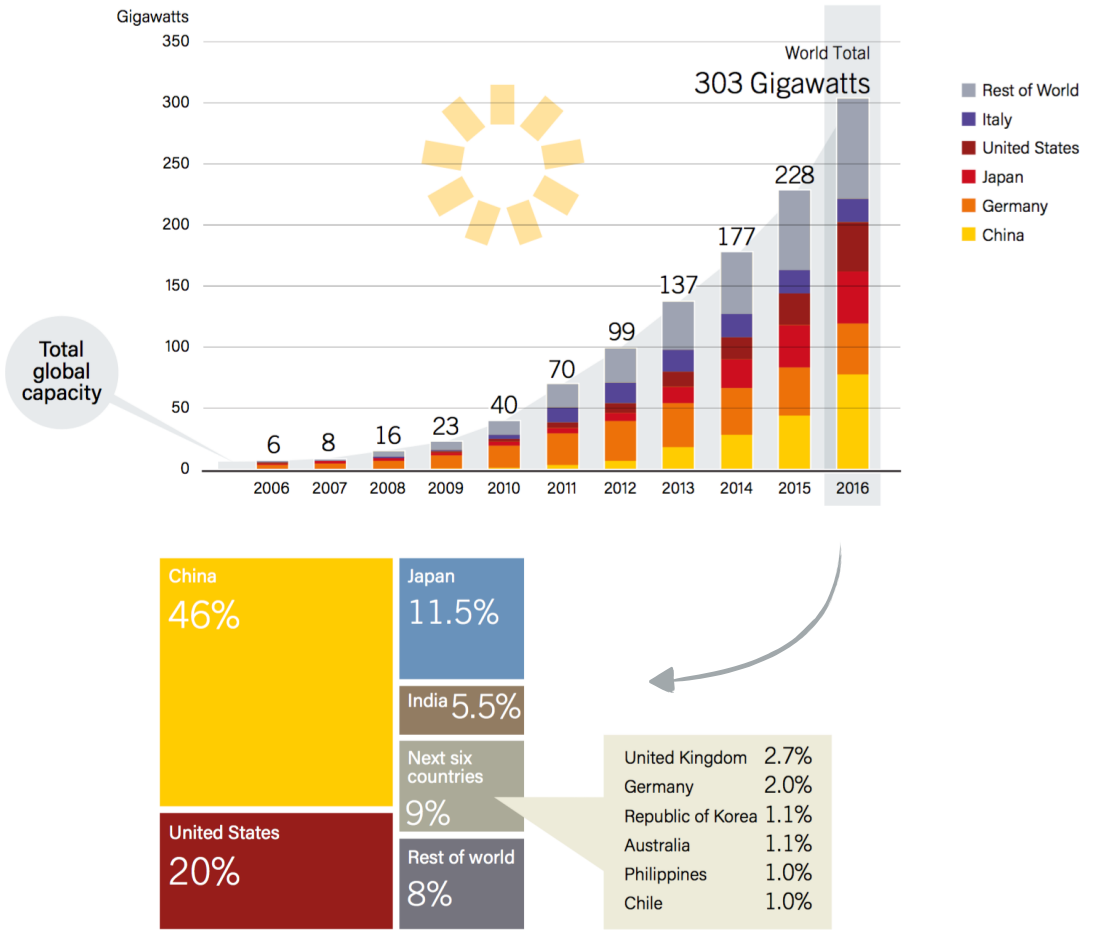
Graphic 2.1 | **Wind Capacity Additions in 2016**



Source: Global Wind Energy Council,Wind Europe Report 2016

APPENDIX A.3

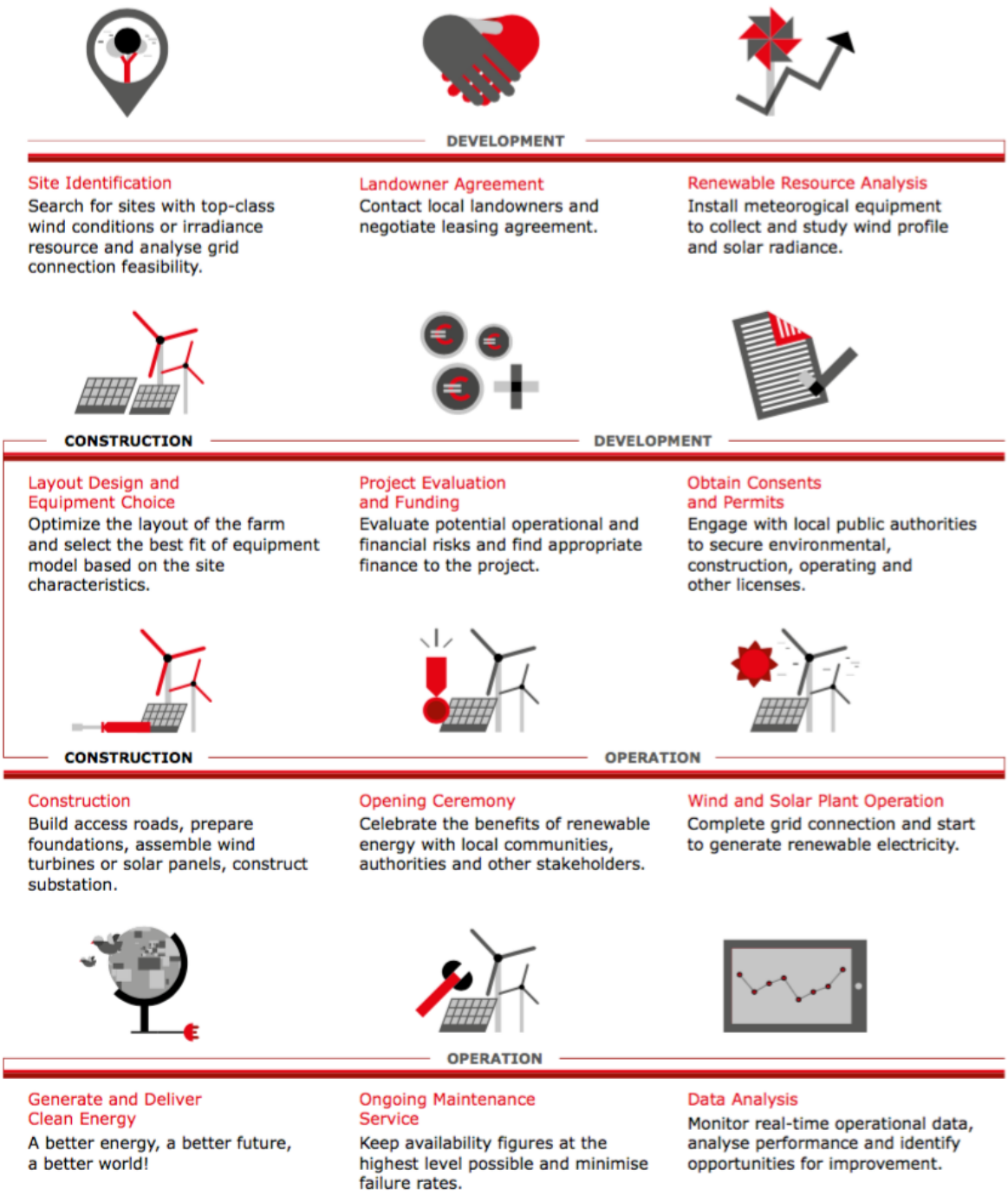
Graphic 2.2 | **Solar PV Global Capacity from 2006-2016**



Source: REN21 Renewables 2017 Global Status Report.

APPENDIX A.4

Figure 3.1 | **Business Case for Renewables**



Source: EDPR Annual Report 2016

APPENDIX A.5

Table 4.1 | **EDPR Key Events**

1996 EDP, then a state-owned utility, builds first wind farms in Portugal

1997 First investments in Spain, launching and operating wind farms

1998 16.2% of EDP share capital sold Iberdrola

1999 EDP Group and Caja Madrid become equity partners of Generaciones Especiales (Genesa), a company dedicated exclusively to renewables in Spain

2001 EDP acquires controlling shares of Hidrocatébrico's operations.

2003 Strategic plan, focusing on profitable growth in high-priority markets and ambitious targets for wind: 300MW in Portugal and 400MW in Spain by 2008

2004 EDP acquires the Ortiga and Safra spanish wind farms (53.4 MW), and three wind farms from Nuon in Brittany (30MW).

2006 Eólicas de Portugal, plan to invest 1,200MW in new wind projects. EDP owned 40% of the company. Acquisition of renewables assets from Agrupacion Eolica and Ceasa.

2007 Purchases of Horizon Wind Energy LLC. EDP the 4th largest wind power company in the world.
Acquisition of 1022MW of wind projects in Poland, through NEO

2008 Acquisition of 1050 MW generation capacity in the US and first investments in Romania, 736MW wind generation capacity.

2009 At EDP, 50% of generation comes from renewables
EDPR enters the Italian market (520MW)
New type of equity financing projects at US

2010 Turbine procurement contract with Vestas, securing 2.1GW of wind capacity. EDP-R commits to 450MW of solar projects, and 1.3GW offshore capacity in the UK

2011 Full control of Genesa, Spain. Agreement signed with Repsol to develop 2.4 GW off-shore capacity in UK, and strategic partnership agreement with China Three Gorges.

2012 New CEO - João Manso Neto

2013 EDPR is granted 20-year tariff for 40 MW to be developed in Italy. EDPR reaches 1,000 MW of new PPA in US

2014 Agreement with Industrias Peñoles. EDP Renováveis established its first institutional partnership structure for solar PV in the US.

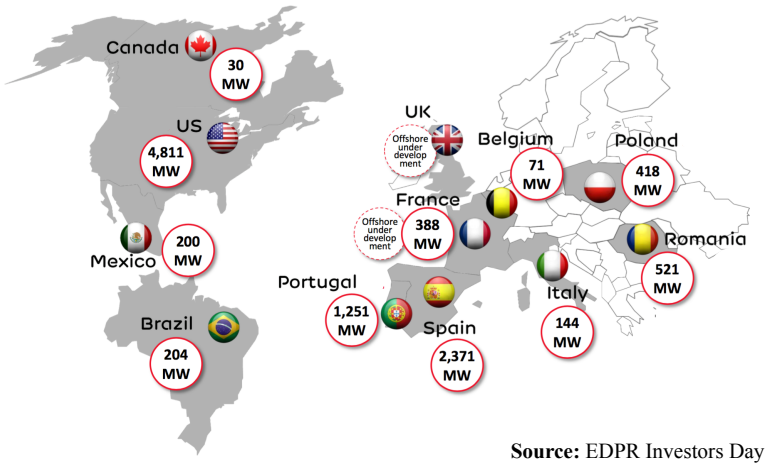
2015 EDPR agrees the acquisition of 45% of EDP Renováveis Brasil. New institutional partnership structure for 99 MW in the US. EDPR exceeds the 2014-17 Asset Rotation target

2016 EDPR completed $343 million funding of tax equity in the US

Source: EDPR Official Announcement Online Platform

APPENDIX A.6

Figure 4.1 | **EDPR Footprint in 2016**



Source: EDPR Investors Day Presentation, May 2016.

APPENDIX A.7

Figure 4.2 | **EDPR Company Profile 2016**

Vision

- A global energy, renewable company, leader in value, creation, innovation and sustainability.

Mission

- Aims to be a long-term market leader in the renewable energy sector, pursuing credibility through safety, value creation, social responsibility, innovation, and respect for the environment.

Headquarters

Madrid, **Spain**

Executive Committee

- João Manso Neto - Vice-Chairman and CEO
- Miguel Dias Amaro - CFO
- João Paulo Costeira - COO Europe & Brazil
- Gabriel Alonso - COO North America

Overall

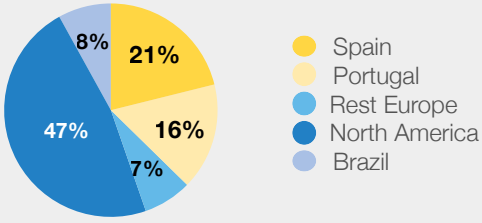
- Market Cap. €6,181.18m
- Shares Outstanding 872.31m
- Generation 24.5 TWh (+4% vs 2015)
- Emissions avoided 20.1mt CO_2
- 1,083 Employees (+6% vs 2015)
- 95% Capacity Certified OHSAS 18001
- Installed Capacity 10.4GW (EBITDA +Net Equity)
- New Additions +0.8GW (EBITDA +Net Equity)

Financials

- Revenues € 1.650,8m
- EBITDA €1,171m +3% vs 2015
- Net Income €56m -66% vs 2015
- Net Dept €2.8b -26% vs 2015
- Capex 1,029 +14% vs 2015

Data collected from: EDPR Annual Report 2016

Revenues



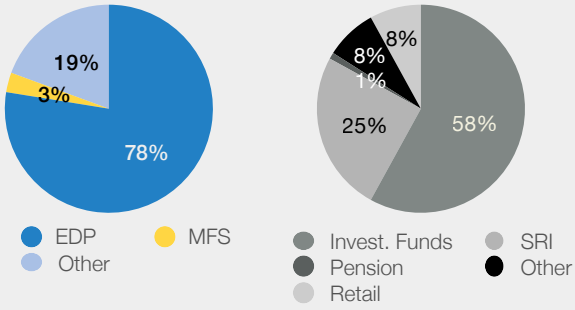
Operational Metrics

- Technical Availability 97.7% +0.1pp vs 2015
- Load Factor 30% +1% vs 2015
- Operating Cash-Flow €869m +24% vs 2015
- Core Opex/MWh €16.3/MWh -8% vs 2015
- Average Selling Price €60,5

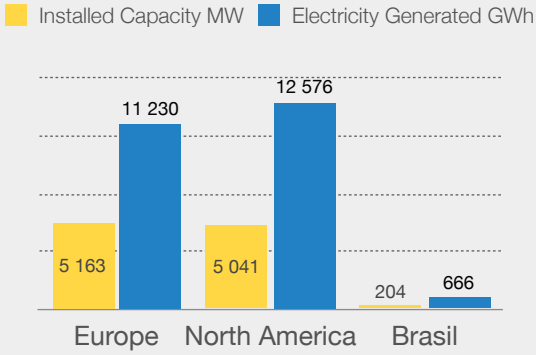
Share Price

- In 2016, EDPR share price closed at €6.04 with an average daily volume of 1.13 million shares.

Shareholders



Production



APPENDIX A.8

Figure 4.3 | **EDPR Performance Evolution**

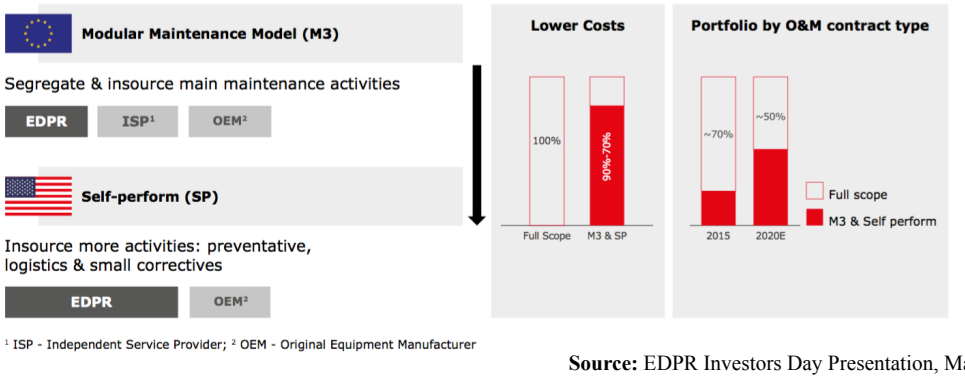
Financial Data (€m)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Revenues	**581,4**	**724,7**	**947,7**	**1 068,8**	**1 285,2**	**1 316,4**	**1 276,7**	**1 547,1**	**1 650,8**
Operating Costs & Other Operating Income	143,6	182,1	234,9	268,1	347,6	395,8	373,5	404,8	479,8
EBITDA	**437,9**	**542,6**	**712,8**	**800,7**	**937,6**	**920,5**	**903,2**	**1 142,3**	**1 171,0**
EBIT	231,6	230,8	289,9	347,5	450,1	473,0	422,4	577,8	564,0
Net Financial Expenses	(74,9)	(72,2)	(174,2)	(233,6)	(274,9)	(261,7)	(249,9)	(285,5)	(350,1)
Net Profit (Equity holders of EDPR)	**104,4**	**114,4**	**80,2**	**88,6**	**126,3**	**135,1**	**126,0**	**166,6**	**56,3**
Operating Cash-Flow	294	392	567	643	666	677	707	701	869
Retained Cash Flow									698
Capex	2 091	1 846	1 401	829	612	627	732	903	1 029
Equity	5 199	5 328	5 394	5 454	5 749	6 089	6 331	6 834	7 573
Net Debt	1 069	2 134	2 848	3 387	3 305	3 268	3 283	3 707	2 755
Institutional Partnership Liability	852	835	934	1 024	942	836	1 067	1 165	1 520

Operating Data	2008	2009	2010	2011	2012	2013	2014	2015	2016
Installed Capacity (EBITDA MW + Eq. Consolidated)	**4 400**	**5 576**	**6 676**	**7 483**	**7 987**	**8 565**	**9 036**	**9 637**	**10 408**
Europe	2 477	2 938	3 439	3 977	4 266	4 796	4 938	5 141	5 163
North America	1 923	2 624	3 224	3 422	3 637	3 685	4 014	4 412	5 041
Brazil		14	14	84	84	84	84	84	204
Electricity Generated (GWh)	**7 807**	**10 907**	**14 352**	**16 800**	**18 445**	**19 187**	**19 763**	**21 388**	**24 473**
Europe	3 900	4 975	6 632	7 301	8 277	9 187	9 323	10 062	11 230
North America	3 907	5 905	7 689	9 330	9 937	9 769	10 204	11 103	12 576
Brazil		26	31	170	231	230	236	222	666
Load Factor (%)	**30%**	**29%**	**29%**	**29%**	**29%**	**30%**	**30%**	**29%**	**30%**
Europe	26%	26%	27%	25%	26%	28%	27%	26%	26%
North America	34%	32%	32%	33%	33%	32%	33%	32%	33%
Brazil		22%	26%	35%	31%	31%	32%	30%	35%
Average Selling Price (€/MWh)	**65,9**	**58,8**	**58,4**	**57,7**	**63,5**	**62,6**	**58,9**	**64,0**	**60,5**
Europe (€/MWh)	98,0	87,2	84,2	88,0	94,2	89,3	80,3	83,0	81,5
North America ($/MWh)	33,2	34,7	34,3	32,8	47,1	48,4	50,8	51,0	46,4
Brazil (R$/MWh)	0,0	0,0	109,4	119,7	286,4	309,2	346,4	370,4	216,1
Employees	**630**	**721**	**822**	**796**	**861**	**890**	**919**	**1 018**	**1 083**

Source: EDPR Annual Report 2016

APPENDIX A.9

Figure 5.1 | **Modular Maintenance Model and Self-Perform Program**



Source: EDPR Investors Day Presentation, May 2016.

APPENDIX A.10

Table 5.1 | **Innovation at EDPR**

Currently research and innovation at EDPR is mainly focused on addressing challenges related with main trends in: **offshore** and **onshore** wind and **solar** energy, energy **storage**, **flexible** grid integration solutions, and new **O&M** procedures and strategies.

OFFSHORE

Windfloat Project: first worldwide full scale floating wind power plant, a solutions for deep waters. Under NER300 funding programme, partnership with Repsol, Trust Wind, Mitsubishi Corporaton and Chyioda Corporation.

Demogravi3 Project: European consortium that aims to validate an innovative hybrid concrete- steel, self-buoyant bottom standing foundation technology. The turbine and foundation will be built and fully assembled inshore, transported to the site, water ballasted to be installed in the seabed, and decommissioned without the need of using heavy lift vessels.

SOLAR TECHNOLOGY

Hybrid Wind And PV Pilot Project: pilot project in Spain of an hybrid technology (wind + photovoltaic) power plant sharing the same BoP infrastructure.

CPV-LAB Project: A test platform embedded in a commercial photovoltaic power plant under construction in Portugal, to evaluate the performance of new photovoltaic technologies such as CPV, glass-glass and bifacial.

ENERGY STORAGE

"Stocare" project: embedded in Cobadin wind power plant, is the first one to use Lithium ion batteries for electricity storage in Romania. The beginning of using combined energy storage solutions and renewable power generation in EDPR, since the end of 2016.

O&M

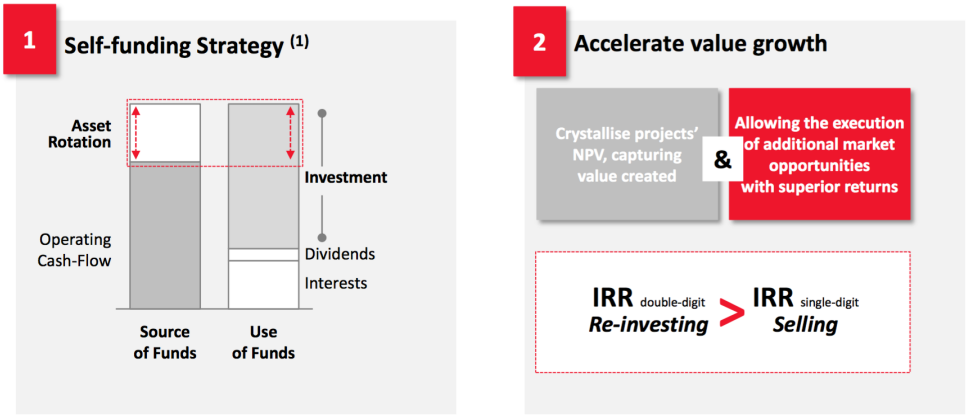
Incorporate big data technologies: using advanced analytics predictive models for wind turbines lifetime optimisation and to build reliable and streamlined end-of-life strategies.

Predictive maintenance: use of new enhanced sensors, condition monitoring systems and airborne drones for inspection to open new possibilities for data collection.

Data Collected from: EDPR Annual Report 2016

APPENDIX A.11

Figure 5.2 | **EDPR's Self-Funding Strategy**



Source: EDPR Investors Day Presentation, May 2016.

APPENDIX A.12

Table 5.2 | **EDPR's Risk Map**

Risk Categories		Risk Groups
Market Risks	It refers to the risk to EDPR resulting from movements in market prices. Due to the relationship between wind production and electricity price production risk is considered within market risk. In particular, market risks are changes in electricity prices, production risk, interest rates, foreign exchange rates and other commodity prices.	Electricity Price Risk; Inflation Risk; Interest Rate Risk; Liquidity Risk; Exchange Rate Risk; Commodity Price Risk; Electricity Production Risk
Counterparty Risk	Risk that counterparty to a transaction could default before final settlement of the transaction's cash flows. A direct economic loss would occur if transactions with the counterparty had positive economic value at the time of default. Even in the case of not defaulting, it may not comply with its contract obligations (timing, quality, etc.), implying additional higher costs due to its replacement or to delays in fulfilling the contract.	Counterparty Credit Risk; Counterparty Operational Risk
Operational Risk	Defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events (such as an increase in equipment default rates, increasing O&M, or natural disasters).	Development Risk; Legal Claims Risk (Compliance); Execution Risk; Personnel Risk; Operation Risk (damage to Physical Assets and Equip. Performance); Processes Risk; Information Technologies Risk
Business Risk	Potential loss in the company's earnings due to adverse changes in business margins. Such losses can result, above all, from a serious increase in equipment prices or changes in the regulatory environment. Changes in electricity prices and wind production are considered market risks.	Energy Production Risk; Wind Turbine Price Risk; Equipment PerformanceRisk; Wind Turbine Supply Risk; Regulatory Risk (renewables)
Strategic Risk	It refers to risks coming from macroeconomic, political, social or environmental situation in countries where EDPR is present, as well as those coming from a change in competitive landscape, from technology disruptions, from changes in energy markets or from governance decisions (investment decisions criteria, Corporate Governance and Reputational issues).	Country Risk; Invest. Decisions Criteria Risk; Corp. Organization and Governance; Competitive Landscape Risk; Reputational Risk; Energy Planning; Technology Disruptions Risk; Meteorological Changes

Source: EDPR Annual Report 2016

02 APPENDIX | PART B

APPENDIX B.1

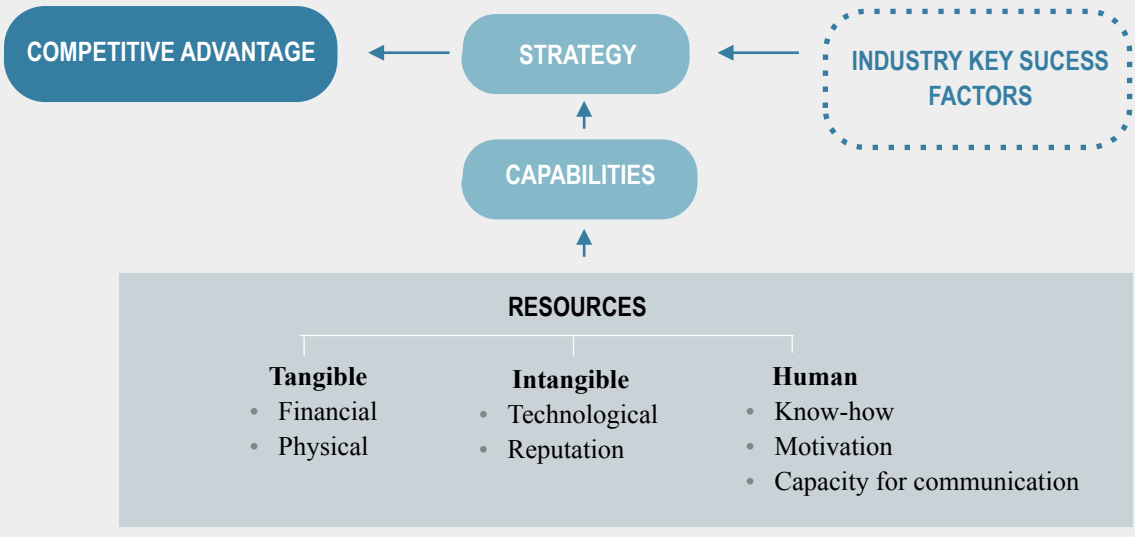
Figure 9.1 | **Identifying key success factors**

What do customers want ? **ANALYSIS OF DEMAND**	How does a firm survive to competition ? **ANALYSIS OF COMPETITION**
• Who are your customers ? • What do they want ?	• What drives competition ? • What are the main dimensions of competition ? • How intense is competition ? • How can we obtain a superior competitive position ?

Source: adapted from *Contemporary Strategy Analysis*, see reference 28

APPENDIX B.2

Figure 9.2 | **Relationship between resources, capabilities and competitive advantage**



Source: adapted from *Contemporary Strategy Analysis*, see reference 28

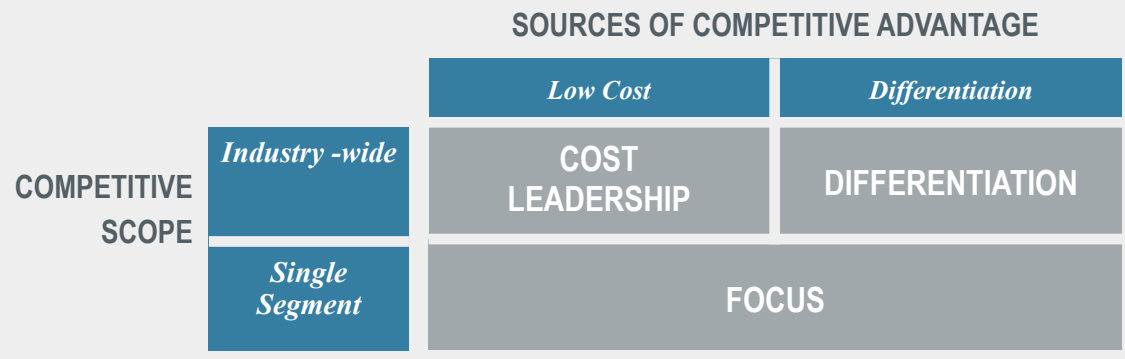
APPENDIX B.3

Table 9.4 | **EDPR's five major core competences**

COMPETITIVE AND RELIABLE FUNDING MECHANISM: Due to the strong financial capabilities, is able to benefit from competitive interest rates. Which is crucial, for companies operating in a capital intensive industry. Expertise using financial instruments, generates a powerful source of competitive advantage for the firm .
OPERATIONAL EXCELLENCE: Highly qualify teams of technicians and engineers, along with an exceptional forecasting and operations management teams, are able to generate high levels of productivity. (M3 and self-performance programs, optimise and reduce Opex).
TECHNOLOGY INNOVATION: Production technology mix (wind and solar), along with a strong investment in innovation, allowed to use high-tech equipment, able to deliver reliable high levels of energy production. Partnerships with top turbine producers (eg. Siemens in the S*torecare* project*),* local governments (permission o test prototypes), and top universities, give to EDPR access to technology developments.
STRONG PRESENCE IN THE US MARKET (With already signed long-term PPA) In this market, EDPR can financially benefit from production tax credits and investment tax credits.
RISK MANAGEMENT: EDPR developed a risk management strategy, able to hedge its assets and eliminate great part of the risk, associated with interest rates and energy prices fluctuations. This is crucial because the renewables industry is characterised by uncertainty.

APPENDIX B.4

Figure 9.5 | **Porter's Generic Strategies**



Source: adapted from *Contemporary Strategy Analysis*, see reference 28

APPENDIX B.5

Table 9.5 | **Sources of Cost Advantage**

Economies of scale : economies of scale arise from three main sources
1. Technical input-output relationship
2. Indivisibilities
3. Specialisation

Economies of Learning
Learning-by-doing, repetition develops both individual skills and organisational routines.

Process technology and Process design
Superior processes can be a main source of competitive advantage.

Product Design
Designs products or equipments for ease of production rather than simple for functionality or aesthetics.

Capacity Utilisation
Increases the production potential of each plant, maximising the ratio of fixed to variables costs and improve the capacity of adjustment.

Input Costs: sources of lower input costs
1. Location (differences in wage rate and suppliers prices)
2. Ownership of low-cost sources of supply
3. Non-union labor
4. Bargaining power

Residual Efficiency
Motivation and organisation culture, along with managerial effectiveness.

Source: adapted from *Contemporary Strategy Analysis*, see reference 28

APPENDIX B.6

Table 9.6 | **Features of Cost Leadership Strategy**

KEY STRATEGIC ELEMENTS	ORGANISATIONAL REQUIREMENTS
• **Scale- Efficient Plants**	• Access to capital
• **Maximise labor productivity**	• Division of labor with incentives linked to quantitative performance targets
• **Design for manufacture**	• Product design coordinated with manufacture
• **Control of overheads**	• Hight cost controls
• **Process Innovation**	• Process engineering skills
• **Outsourcing**	• Balance between in-house and outsourced activities

Source: adapted from *Contemporary Strategy Analysis*, see reference 28